



# Up Close

*on the Summer Student Program*

A monthly insert on special topics at Lawrence Livermore National Laboratory. This month: the Summer Student Program.

July 2003

Focus on

## Summer Student Program

— Don Correll, STEP Director



### Summer program brings new blood to the Lab

An important way in which Livermore Lab recruits employees is through the Scholar Employment Program, often referred to as the summer student program. In addition to the few hundred graduate student employees and student guests who are on site during the academic year, LLNL hosts each summer an additional 500 students who are engaged in various research projects for the summer academic break.

Summer students range from a few exceptional high school students to undergraduate and graduate college students from major universities throughout the United States, and occasionally outside of the United States. Summer students are placed within programs that span the entire portfolio of the Lab's mission-based science.

Because the summer student population varies in age, discipline and academic background, the Lab provides a summer program to address the diversity of student interests that go beyond just the research experience. The summer program consists of lectures, panels, tours and social activities that support a broad introduction to the Lab's research and culture. Activities focus on topics of interest to college students who want to continue their education and relationship with LLNL.

The Laboratory-wide Institutional Education Committee manages the summer student events program, consisting of 120 events starting in May and ending in August. LLNL employees representing each of their respective Laboratory organizations volunteer to participate in IEC. The IEC is chaired by Barry Goldman, STEP's college internship manager, and facilitated by STEP personnel.

The growth and continuing success of the summer program is due principally to the IEC members, who have provided input for the development of the Student Bulletin Board and have facilitated seminars, tours, brown bag lunches, socials and panel discussions.

Perhaps the institutional highlight of the summer program is the Student Research Symposium. The Student Research Sympos-

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### Getting 'Up Close' with Summer

**Editor's note:** This special "Up Close" section of Newsline, spotlighting the Laboratory's summer student program, is a monthly series featuring LLNL programs. Upcoming special sections will focus on innovative science, environmental research as well as other programs. ♦

## A hands-on look at big science

The "summer program" is designed to give students a hands-on look at cutting-edge science and the compelling national security missions that research supports.

"For the Laboratory to remain the dynamic, cutting-edge research and development institution it has been over the last 50 years, we need to continue bringing in young talent," said Laura Gilliom, director of the University Relations Program. "To attract bright young researchers, we need to convey the sense of possibility that comes from doing cutting-edge science and the excitement of the Lab's national security missions. The summer program is designed to do just that."

The summer program for students is but one of the ways in which young talent is brought to the Lab. Yearround internship and scholarship opportunities, administered by individual directorates and/or research programs, also serve to bring students to the Laboratory.

Approximately one-quarter of the summer student population placed throughout various areas of the Laboratory is assigned to specific internships managed by STEP. "These programs are funded



Jacqueline McBride/Newsline

Student Sarah Nelson of the Chemistry and Materials Science Directorate prepares samples in a lab as part of her work with the Glenn T. Seaborg Institute.

directly by the National Nuclear Security Administration (NNSA)/Defense Programs (DP)/Office of University Partnerships (OUP) in support of the NNSA's Critical Skills Internship Program (CSIP)," said Barry Goldman, STEP's college internship manager.

STEP directs the student programs aligned under CSIP to facilitate the research internships for undergraduate and graduate school students

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## Graduating to a permanent Lab career

By Anne M. Stark

NEWSLINE STAFF WRITER

When John Knezovich started working at the Lab in 1977 as a 21-year-old, he didn't get paid a dime. But he did get credit for independent study while attending the University of the Pacific as an undergraduate.

After he graduated that summer, he was hired on as a student researcher and made \$5 an hour.

"I was still a student so for me that was beer and rent money," said Knezovich, who is now director of the Lab's Center for Accelerator Mass Spectrometry. "I worked for most of the rest of the time until I went back to grad school."

Knezovich kept his ties at the Lab and earned his master's degree while working on a Lab program studying the impact of heavy metal emissions from nuclear power plants on near shore environments. He wrote his Ph.D. thesis on a Department of Energy program looking at the impact of organic compounds on marine environments, and was hired on as a full-time scientist as soon as he was out



John Knezovich circa 1980 studies the impacts of organic compounds on marine environments as part of his Ph.D.

of graduate school.

"I graduated on a Friday and showed up on a Monday," he said. "They wanted me here two weeks earlier... This is my life. I've had many different jobs here. That's the nice thing about the Lab — you can have several different careers at the same place."

Though there was no formal summer student program when Knezovich first began at the Lab, he was one of a handful of students who came to work at the Lab early in their careers.

Cindy Conrado, an environmental scientist in the Energy & Environment Directorate, started her Lab career even earlier: as a 17-year-old Granada High School student in the summer of 1971.

She and another high school student transferred hard-copy personnel files onto microfiche that first summer. While working at the Lab, she was introduced to someone in the biomedical field, something she was already interested in studying when she got to college. By her second summer job of 1972,

Veterans, See page 4



## Quotes

"The summer program has been great for me, primarily because of the wide range of science that I've been exposed to. Working with Energy and Environment has put me in direct contact with physicists, geophysicists, geochemists, atmospheric scientists, engineers, statisticians and many others. The time I've spent here has been fruitful."

*Keith Henderson, 23, Purdue University*



Keith Henderson

"I am currently working in ICCS doing maintenance programming for the NIF project. It's great experience and I already have some of my work being tested/released to the NIF facility. I think it's great to get some 'real world' experience and it is giving me practice in communicating with other people and improving my record-keeping skills."

*Nathaniel Coser, 23, University of the Pacific*



Nathaniel Coser

"Being surrounded by the fastest computers in the world gives me confidence that I am working at the boundary of current scientific knowledge. My mentors in computational astrophysics have likewise provided me with a high level of cooperation and scientific prowess."

*Christopher Lambert, 25, UCSB*



Christopher Lambert

"I love working in DTED because there are many opportunities for many different types of technical and engineering jobs. Over the past few weeks I have used my technical skills from school and learned many new things. My experience as a summer student at LLNL has been a great one, and I would love to continue working in such a safe and great environment."

*Ysidro David Avila, 22, San Joaquin Delta College*



Ysidro David Avila

# Three times for the charmed

By Leslie Schwartz

NEWSLINE STAFF WRITER

After spending three summers as an intern at the Lab, Patrick Buckley has nearly done it all — from the National Ignition Facility to microtechnology to his current project helping stroke victims.

This year, Buckley is working in the Medical Physics and Biophysics Division (M Division), under Duncan Maitland, on a new way to actuate endovascular surgical devices made from shape memory polymer, which remove blood clots from the brain in a stroke victim.

During the summer of 2001, Buckley worked at NIF in the optical assembly group, conducting vibration tests and helping in the design of an optical transportation fixture. Last summer, he worked in the microtechnology program on a project to automate the capture of single cells for the purpose of testing.

When he first came to the Lab three summers ago he "expected to learn a lot and did. I was not sure what the working environment was going to be like but I was pleasantly surprised. My co-workers and supervisors were very helpful and friendly."

Buckley, 22, first heard about the opportunity to be a summer intern through the engineering internship program at MIT, where he recently graduated with a bachelor's degree in mechanical engineering.

"I wanted to explore the different areas of mechanical engineering and felt that the Lab was the perfect place to be able to see many different aspects of applied engineering," Buckley said.

"The seminars and lectures that are provided for the students and employees are great. I have learned a great deal about some interesting things that I would not have otherwise known. These lectures have shown me the creative and ingenious ways that people



Jacqueline McBride/Newsline

*Patrick Buckley creates a computer simulation showing how a Lab-created device can remove blood clots from the brain of a stroke victim.*

approach scientific problems, and I have applied these lessons to my own research."

Buckley's experiences at the Lab have taught him the importance of knowing the talents of the people he is working with, because "you have to be able to harness peoples skills. When you do this you learn more and your research is much easier."

"I believe that summer students can often provide new and fresh ideas to a project and at the same time learn a great deal about a field of research from their supervisors," he said. "Summer students need to ask a lot of good questions, and supervisors have to have the patience to answer these questions. The intern program is also very important to get students exposed to working at the Lab and attracting them to work here after they graduate."

And that's enough to keep him coming back. Buckley is currently participating in a joint MIT-LLNL program, where he is doing his thesis work for his master's degree, which he will receive next June.

He also has ambitions to run his own business. When asked about recommending a Lab internship to friends, he replied, "There is a huge amount of interesting stuff going on here." ♦

## Fifty years of building education

Throughout its 50-year history, the Laboratory has maintained close links to the education community at all levels, and provided access to its unique research facilities and scientific expertise.

In the early years science activities lacked the institutional perspective that drives Laboratory education efforts today. Summer programs for students have proliferated, grown and evolved into a more formal set of activities meant to give students a hands-on look at a research laboratory.

The Laboratory's current Education Program was established in December 1990 by former Director John Nuckolls in answer to then Under Secretary of Energy Admiral Watkins' call for more involvement by the national labs in improving science education. Manuel Perry was named the first director of the LLNL Education Program, which brought K-12 and college-level efforts under one program.

The Undergraduate Summer Institutes were

founded in 1985 under the leadership of Director-at-Large Bruce Tarter. What began as a two-week program of lectures, panel discussions and tours has evolved today into a 10-12 week program that includes a full summer job.

Each year some twenty outstanding science and engineering students entering their senior year at some of the nation's top colleges and universities are selected to come to the Laboratory for lectures, tours and to carry out research projects under the guidance of leading University of California faculty and LLNL researchers.

In 1998, the K-12 science education program and college internships became separate programs within the newly defined Science and Technology Education Program, or STEP, headed by Don Correll. STEP serves as an umbrella for a number of summer programs at the Laboratory and the Lab's liaison with the new Edward Teller Education Center (<http://etec.ucdavis.edu>) ♦



Edward Teller  
Education Center



# Developing skills that compute

By Leslie Schwartz  
NEWSLINE STAFF WRITER

Granada High School senior Emily Eder was looking for a summer job where she could expand on some of the skills she acquired while working on her Tri-Valley Science and Engineering Fair project on parallel computing.

That search landed her in the ranks of summer students at the Lab.

"I first heard about the internship from a fellow student who is currently working for the College Cyber Defenders (CCD) program at Sandia," 16-year-old Eder explained. "I wanted a summer job where I could really learn something and I had taken two programming classes at Las Positas College, where I discovered that I really enjoy working with computers."

Eder is one of the few high school students who are part of the summer student intern program. She is working in the CCD program in conjunction with the Center for Applied Scientific Computing (CASC). CASC computational scientists Edmund Chow and Van Henson, as well as Terry Brugger from the Information Operations Assurance Center (IOAC), supervise her.

Eder is currently analyzing the effects quantum computing will have on computer security and cryptology. Her focus is on quantum computing using algorithms and digital signatures.

"Working at the Lab has shown me a side of computing that I had never before examined," she said.



High school student Emily Eder demonstrates her work on computer security and cryptology to mentor Terry Brugger and college student Bridget Benson.

Before she started at the Lab through the summer program, Eder "really did not expect such an extensive program for the summer students. I also did not fully understand everything that performing research implied until I started working here."

As one of the youngest students in the summer program, Eder said: "It has been a unique experience working here while in high school. I have received nothing but support and encouragement from the other interns, both in the CCD program as well as other programs."

"Due to the research I've been performing on computer security, I will definitely be looking at taking many more classes on cryptology when I go to college. I have learned an immense amount of material in just a matter of weeks."

# Charting her course for research

By Leslie Schwartz  
NEWSLINE STAFF WRITER

Cherie McCaffrey never imagined that a lifelong interest could actually translate into a summer job.

As a first-time student intern, McCaffrey is spending her summer analyzing the organizational structure and internal workings of terrorist groups, under the direction of Deborah Ball in the Proliferation Prevention & Arms Control (PPAC) Program. PPAC is part of the Nonproliferation, Arms Control and International Security Directorate at the Lab.

"As a Livermore resident for nearly three years, I have been very aware of activity at LLNL, and learned of many opportunities offered to students working as Laboratory summer interns or employees," 18-year-old McCaffrey said. "This is the first time I have ever been paid to think and research, as compared to my other work experience in the realm of retail and customer service."

As a history major at UC Santa Barbara, McCaffrey says her research project supplements her field of study, Islamic studies, and has allowed her to pursue her interests in a more specific manner than possible in any courses offered through school.

"Over the past year, I have struggled to make time in my busy college schedule to research terrorism and politics in the Middle East. Now I have eight hours a day to research a subject I am passionate about and work alongside experts in the field I hope to enter for a career," McCaffrey said.

"And I get paid," she added happily.

McCaffrey said working with professionals has



College student Cherie McCaffrey pinpoints terrorist activities in the Middle East as part of her summer project.

enabled her to view each issue she is researching through many different angles based upon the experiences, emphasis and background of each professional.

"I never expected so many opportunities to meet and interact with so many individuals, whether interns or employees," she stated. "I have made many good friends in the short time I've been working at LLNL, and am grateful for all the opportunities I have had to learn from and interact with renowned scientists."

As an advocate for the summer intern program, McCaffrey said: "The intern program is necessary to maintain an atmosphere through which scientists and professionals can proudly exhibit the products of their work to students embarking upon the beginnings of similar career paths, and is also necessary to attract future employees to the LLNL family."

## Quotes

"I have been on the highest learning curve in my life during these past few weeks at the Lab, which has been in preparation for the models I am running in NARAC. I can see that my experience here has been just as colorful as the results on my computer screen."



Leonard Lucas

Leonard Lucas, 20, Carnegie Mellon University

"I love working in Mechanical Engineering because it brings together so many concepts to solve physical problems. Over the past few weeks, I have learned about fracture mechanics; met with top scientists in the field; seen research at the design, testing and analyzing stages; and observed how a creative vision can bring research into real-world applications. My experience has been engaging and captivating."



Michelle Hackett

Michelle Hackett, 23, Oregon State University

### IEC membership Summer 2003

#### Chair

Barry Goldman - Science & Technology Education Program

#### Directorate members

Lynda Allen - Seaborg Institute  
Christine Bell - Energy & Environment  
Ron Conant - PAT/V Division  
Cindy Conrado - Energy & Environment  
Dianne Gates-Anderson - Radioactive & Hazardous Waste Management  
Rodney Grayson - Classification  
Marta Holm - EE-DSED  
Karen Lema-Crowe - PAT-AD Office  
Lisa Lopez - BBRP  
Linda Lucchetti - Public Affairs  
Pamela Mears - ISCR  
Diana Toon - Recruiting & Employment  
Maxine Trost - Innovative Business & Information Services  
Paul Weiss - Chemical Biology & Nuclear Science

#### Student members

Brett Isselhardt - Undergraduate Summer Institutes  
Aaron Miles - AX Division/graduate student (former participant in HED Physics Student Program)  
Sarah Nelson - CSIP's Nuclear Science Internship Program

#### Sandia representative

Jan Bachman - Sandia /Student Programs



Student Research Symposium, Aug. 6, 2003



# Summing up their research. . .

One of the more popular activities within the summer program is the “How to Create Effective Poster Presentations” workshop that discusses effective poster communication. The workshop includes templates that students can use to create their own poster for the Student Research Symposium.

By having students present their research achievements to a broad set of Laboratory employees, the Student Research Symposium creates a unique environment for celebrating and fostering appreciation of the valuable role students can provide to Laboratory research. The symposium also helps to support the students’ educational research experience and the Lab’s goals for a highly talented and diverse workforce.

Hal Graboske, LLNL’s deputy director for Science and Technology, described last year’s symposium: “I was impressed by the quality and breadth of the students’ science-and-technology posters assembled for this event. As I mentioned to several managers, the quality of the students, the quality of the Lab S&Es who were mentoring them, and the quality of the work were all first-rate — it looked just like a national-professional-society poster session.”

## Overview

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entering careers important to the intellectual capability required by the Lab’s national security missions.

From the students who participated in CSIP from fiscal years 2001 to 2002, 27 were hired as Laboratory employees during the same period, a hiring rate of 10 percent to 15 percent per fiscal year.

The student programs are arranged within four major disciplines: chemistry and materials science, computer science, engineering and physics. An effort is made to match students with mentors in their particular field of interest or study.

Another avenue for summer students to arrive at the Lab is the “Undergraduate Summer Institutes in Applied Science.” For 10 weeks each summer, outstanding science and engineering college seniors throughout the United States come to the Lab to carry out research projects and participate in lectures, seminars and panel discussions.

“The program now includes a full summer

job,” said Charlie Westbrook, coordinator of the Undergraduate Summer Institutes. “It began as being only physics, but now includes all scientific disciplines at the Laboratory.”

The program is designed to give students hands-on experience with leading-edge research, such as Laboratory Directed Research and Development projects, and convey the importance and excitement of Lab missions, according to Westbrook.

“We tell them we want them back,” he said, either as “graduate students, postdocs or employees. The whole idea is that the more time they spend at the Lab, the more likely they are to stick.”

Many Lab researchers who work with students “have the teaching gene,” Westbrook notes, adding that “Those researchers really benefit from having the students around.”

Technical subject areas for student assignments and workshops range from laser fusion to computational modeling. Students also gain hands-on experimental, theoretical or computational experience by completing a small project.

The Labwide Institutional Educational Committee (IEC) organizes and plans a wide array of events, from social activities to more formal seminars and training sessions.

The activities give students an opportunity to network with one another and learn more about the Lab’s projects and people, as well as to acquire and sharpen some useful skills, such as presentation delivery, to assist them in their careers.

“The focus is to give students a rewarding experience by providing a hands-on look at research, a view of the breadth of career options as well as the opportunity to socialize and network with their peers,” Goldman said. “It’s an intensive program but also meant to be enjoyable.”

The Undergraduate Summer Institutes typify the attitude of educational outreach and internship programs across the Laboratory. “We want to fascinate these kids enough that they will feel compelled to come back,” said Westbrook, noting a good number have returned and that there are currently about 20 Lab employees who are graduates of the program. ◆

## Focus

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sium, held in early August in the Lab’s West Cafeteria, is modeled after poster sessions that are the main stay of most professional scientific meetings (see story page 4). This year’s symposium (<http://step.llnl.gov/symposium/>) will be held Wednesday, Aug. 6, in the West Cafeteria.

The Laboratory’s continuing commitment to education has roots in the close relationship between Livermore and the University of California system, and the deeply held belief of Lab co-founder, Director Emeritus Edward Teller: Education programs are necessary to bridge the gap between the basic science of academia and the applied science vital to the Laboratory’s unique national security missions. The Laboratory’s leading-edge research requires the development of specific skills not readily available from universities.

At age 95, Teller continues to play an active role

in the summer program for students as well as other Lab education efforts, including workshops for K-12 science teachers. His presentations traditionally open and close the summer program. A question-and-answer session with Teller is a highlight of the summer for those students fortunate to attend.

Another objective of the summer program is to open students’ eyes to the numerous possibilities of research by exposing them to the Lab’s multi-disciplinary team approach to applied science. Many college students are surprised by the breadth of opportunities in the variety of R&D fields that support the Lab’s mission-based research. Students are equally surprised to learn that veteran Lab researchers have had “multiple careers” across science disciplines without ever leaving the Laboratory.

By engaging students in mission-based science, the Lab is developing a pipeline of future scientists and engineers who will be equipped and ready to enter its workforce with knowledge beyond that the students receive from their academic institutions.

In addition, student evaluations have shown that summer students end their research experiences and their participation in the summer program with extremely positive impressions of the Laboratory’s culture of using a multidiscipline, team approach to meet the corresponding mission-based goals.

A summer research position is highly valuable to both students and the Laboratory. However, a summer at LLNL can be a challenging experience if students feel isolated. The IEC chair and members, with help from STEP and other directorate personnel, ensure that summer students feel supported and connected by providing a summer program that is complementary to their research experience. As a result, the Lab continues to receive many positive comments from students about their summer research experiences, including the following:

- “I love working at LLNL! I would highly recommend it to anyone interested in research.”
- “I had a great experience and look forward to working with everyone next summer!” ◆

## Veterans

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she was part of the Work Education Experience Program (WEED), working as a lab assistant in what was then the Biomedical and Environmental Research Program.

Conrado continued working summers as she studied environmental science at Cal State Sacramento. During her junior and senior years, she worked at the Lab two to three days a week and commuted from Sacramento. She figured by putting her time in during summer and off-school days, she would most likely get a job when she graduated.

“After graduation, I was hired on as a technician and then eventually was brought in as an environmental scientist,” she said.

And now as a scientist in the Lab’s Marshall Islands program, Conrado is giving back to the summer intern program by serving on the Laboratory-

wide Institutional Education Committee.

“We are really getting the best and the brightest because we want them to eventually work here,” she said.

And even earlier, Associate Director-at-Large Bruce Tarter started his Lab career as a summer graduate student in 1962 and ’63, long before he was sure of his chosen profession as a physicist. He chose Livermore because “it was one of the few labs that paid for transportation costs, but I really had no sense of this place,” he said in a 1994 interview.

Though Chad Kecz worked as an intern more recently in the summer of 2000, the electrical engineer in the Defense Sciences Engineering division said he gained valuable experience while working at the Lab as a graduate student.

He now works in the Proliferation Detection and Defense Systems (PDS) section of NAI.

Kecz’s advice to summer interns: “Learn as much as you can while here. There are a lot of smart people running around these hallways.” ◆

## Student summer program resources available on-line

Summer students have a multitude of additional resources at their fingertips. For more information on summer programs, check these Websites:

### Student Bulletin Board

<http://education.llnl.gov/sbb/>

### Student Portfolio

<http://step.llnl.gov/portfolio>

### Scholar Employment Program

<http://www.llnl.gov/llnl/02employment/hire/studentfaculty.html>

### Critical Skills Internship Program

<http://internships.llnl.gov>

### Undergraduate Summer Institutes in Applied Science

<http://www.cms.llnl.gov/usi>